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Design and Fabrication of Hand Gesture Controlled Wireless Robot

Mr. Sunil Kumar Jena
Assistant Professor,
Department of Mechanical Engineering,
VITS College of Engineering,
Sontyam, Anandapuram, Vizag.

Mr.B.Arjuna Rao
Student,
Department of Mechanical Engineering,
VITS College of Engineering,
Sontyam, Anandapuram, Vizag.

Mr.B.Yellagi
Student,
Department of Mechanical Engineering,
VITS College of Engineering,
Sontyam, Anandapuram, Vizag.

Abstract:

In today's world, in almost all sectors, most of the work is done by robots or robotic arm having different number of degree of freedoms (DOF's) as per the requirement. This paper deals with the Design and Implementation of a "Wireless hand Gesture Controlled Robotic Arm with Vision". The system design is divided into 3 parts namely: Accelerometer Part, Robotic Arm and Platform. It is basically an Accelerometer based system which controls a Robotic Arm wirelessly using a, small and low-cost,3-axis (DOF's) accelerometer via RF signals. The Robotic Arm is mounted over a movable platform controlled wirelessly by another accelerometer. One accelerometer is mounted / attached on the human hand, capturing its behaviour (gestures and postures) and thus the robotic arm moves accordingly and the other accelerometer is mounted on any of the leg of the user / operator, capturing its gestures and postures and thus the platform moves accordingly.

In a nutshell, the robotic arm and platform is synchronised with the gestures and postures of the hand and leg of the user/ operator, respectively. The different motions performed by robotic arm are: PICK and PLACE / DROP, RAISING and LOWERING the objects. Also, the motions performed by the platform are: FORWARD, BACKWARD, RIGHT and LEFT. The system is equipped with an IP based camera also which can stream real time video wirelessly to any Internet enabled device such as Mobile Phone, Laptop, etc.

I.INTRODUCTION:

Objective of Project

* Our objective is to make this device simple as well as cheap so that it could be mass producedand can be used for a number of purposes

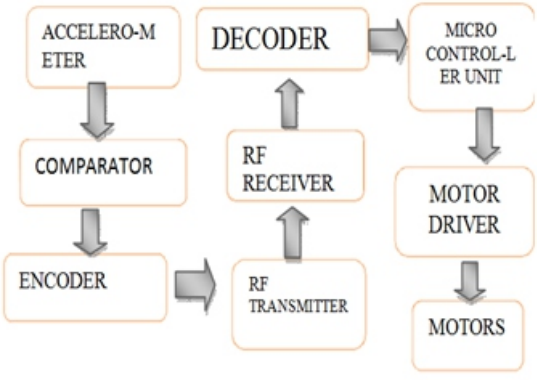
* A Gesture Controlled robot is a kind of robot which can be controlled by our hand gesture not by old buttons
* We just need to wear a smalltransmitting device in our hand which included an Accelerometer.This will Transmit an appropriate command to the robot so that it can do whatever we want.
* We divided our task into two parts to make the task easy and simple and to avoid complexity and make it error free.

The first is the transmitting section The second is the receiving end which comprises of following main components:

o RF Receiver Module
o Decoder IC
o Microcontroller
o Motor Driver IC
o DC Geared Motors

which includes the following components:

- Accelerometer
- Comparator IC
- Encoder IC
- RF Transmitter Module



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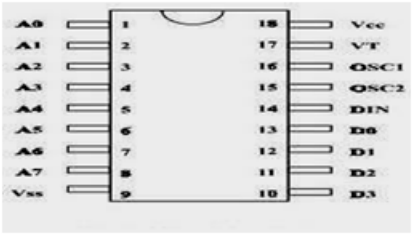
RF Module (Rx/Tx)

Radio frequency (RF) is a rate of oscillation in the range of about 3 KHz to 300 GHz, which corresponds to the frequency of radio waves, and the alternating currents which carry radio signals.

Decoder IC (Pt2272)

PT2272 is a remote control decoder paired with PT2272 utilizing CMOS Technology. It has 12 bits of tri-state address pins providing a maximum of312 address codes; thereby, drastically reducing any code collision and unauthorized code scanning possibilities. The input data is decoded when no error or unmatched codes are found. It has 1 input while 7 output pins. The address pins can also be utilized as data pins.



Camera:

The system uses a smartphone with camera for continuous real time video streaming of the system and its surroundings. An IP-based Android application, running on the smartphoneenables the system to transmit the real time video wirelesslyA camera is an optical instrument that records images that can be stored directly, transmitted to another location, or both.

These images may be still photographs or moving images such as videos or movies. The term camera comes from the word camera obscura (Latin for "dark chamber"), an early mechanism for projecting images. The modern camera evolved from the camera obscura. The functioning of the camera is very similar to the functioning of the human eye

Wireless A/V Camera

Specifications of wireless camera

* Camera apparatus :1/3, 1/4 picture sensor
* Validity pixel : 628 X 582 NTSC:510X 492
* Minimum illumination: 3LUX
* Output power:50m W/250mW/300mW
* Frequency control:0.9G/1.2G
* Voltage:DC+9V
* Current:200mA/300mA
* Transmission signal:picture,sound

Display:

A display device is an output device for presentation of information in visual or tactile form (the latter used for example in tactile electronic displays for blind people). When the input information is supplied as an electrical signal, the display is called an electronic display.Common applications for electronic visual displays are televisions or computer monitor

Features of display

* Availabl for vcd/dvd/gps/camera
* High-resolution picture
* Full colour display

Low power consumption

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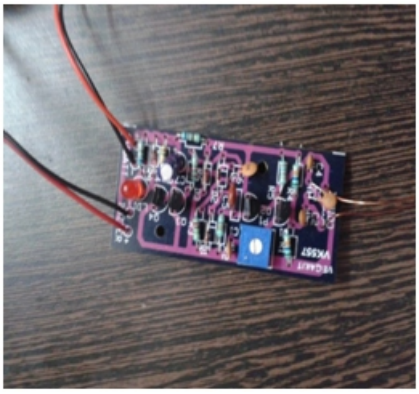
Metal Detecting Sensor

A metal detecting sensor is an electronic instrument which detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried undergroundIf a piece of electrically conductive metal is close to the coil, eddy currents will be induced in the metal, and this produces a magnetic field of its own. If another coil is used to measure the magnetic field (acting as a magnetometer), the change in the magnetic field due to the metallic object can be detected.



Metal detecting sensor (VK557)

- Detection of land mines
- Geophysical prospecting
- Archaeology
- Treasure hunting

Detect steel reinforcing bars in concrete.

Platform Preparation

Platform is nothing but that part of the project onto which the robotic arm is mounted. The platform is fitted with dc motors and its movement is synchronised with the leg gestures of the user, operating the robotic arm.

Dimensions for platform:- Heght:5cm
Length: 21cm Breadth :21cm Material: iron

CONCLUSION:

In our project, the robot is designed to move by our command. The robot acts according to the Command given by the program. It will move all the direction like forward, reverse, right and left. The video and audio are monitored at the control unit. In this prototype project, we design in such a way that this robot can be moved anywhere and it can get the information of particular place. This project is very much useful in the places where a human cannot go into the places like ground canals, smoke oriented caves and this project is very much useful in such situations. An alerting message will be sent to a prescribed using RF module.If particular direction we will give according to that only our robot will move and that movement will be seen by camera. So that it`s easy to detect any faults or dangerous in the industry. It leads easy process without interaction of human.

FUTURE SCOPE:

» Achieving more accuracy
» Implementing more number of gestures
» Identifying the multiple number of gestures
» Applying gesture recognition for accessing internet applications
» Provide editing mechanism by using gestures
» Adding GPRS and GPS

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